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| Preparation for International | ) | |
| Telecommunication Union World | ) | IC Docket No. 94-31 |
| Radiocommunication Conferences | ) | |

**JOINT SUPPLEMENTAL REPLY COMMENTS**

Submitted by:

CTA COMMERCIAL SYSTEMS, INC.

E-SAT, INC.

FINAL ANALYSIS COMMUNICATION SERVICES, INC.

GE AMERICAN COMMUNICATIONS, INC.

LEO ONE USA CORPORATION

ORBITAL COMMUNICATIONS CORPORATION

STARSYS GLOBAL POSITIONING, INC.

VOLUNTEERS IN TECHNICAL ASSISTANCE

May 18, 1995

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## SUMMARY

In this supplemental filing, nine companies, representing all of the pending applicants for new or modified facilities in the Non-Voice, Non-Geostationary Mobile Satellite Service (NVNG MSS), jointly propose specific frequency bands for allocation to the NVNG MSS at WRC-95. This proposal reflects the substantial amount of work that has been undertaken by the parties to identify the optimal 10 MHz of spectrum for sharing by the NVNG MSS. This spectrum is needed to accommodate new system proposals and to meet expected market demand as fully detailed in previous comments in this proceeding.

The spectrum proposal is as follows:

- Service Downlink: 386-390 MHz
- Service Uplink: 420-422, 455-456 and 459-460 MHz
- Feeder Downlink: 216-216.5 and 217.5-218 MHz
- Feeder Uplink: 450-451 MHz

These frequency bands have been deemed optimal for sharing based on such factors as (1) sharing compatibility of existing users and allocations with the NVNG MSS; (2) relatively low level of usage and/or intermittent type of use by existing licensees in the bands; (3) global availability; and (4) proposed allocations, advance publication and/or operation of NVNG MSS systems by other countries in the subject bands.

The frequency selections also achieve a balance between government (6 MHz) and non-government (4 MHz) spectrum in the 100-500 MHz range. While the government frequency bands have been selected on the basis of publicly available information about government use,

the parties have not been provided with access to the government database to review government spectrum usage and operational characteristics, despite their repeated requests to do so. It is hoped that this proposal will elicit confirmation from NTIA that sharing is feasible or, alternatively, identification of alternate bands. The parties are willing to consider whatever frequency bands may be suggested by NTIA as optimal for sharing which meet the requirements for NVNG MSS use.

For reasons more fully detailed in this filing, the Commission should recommend that the United States support worldwide allocation of the foregoing frequency bands to the NVNG MSS, on a co-primary basis, at WRC-95.

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**JOINT SUPPLEMENTAL REPLY COMMENTS**

These Joint Supplemental Reply Comments are submitted by the eight undersigned parties consisting of all pending applicants for new or modified facilities in the Non-Voice, Non-Geostationary Mobile Satellite Service ("NVNG MSS").[1] The joint comments supplement the previous comments submitted by the respective parties in the above-captioned proceeding relating to preparation for the 1995 World Radiocommunication Conference ("WRC-95").[2]

## I. BACKGROUND AND SUMMARY

In their respective reply comments filed April 14, 1995, the undersigned parties unanimously urged the Commission to support allocation of an additional 7 to 10 MHz of spectrum, preferably below 500 MHz, to support new NVNG MSS proposals and to provide additional

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[1] In the United States, these systems are referred to as the NVNG MSS or MSS Below 1 GHz. However, internationally, the systems are referred to as the Non-Geosationary Mobile Satellite Service (Non-GSO MSS or NG MSS). For purposes of this filing, the U. S. terminology has been used.

[2] FCC 95-36, released January 31, 1995.

spectrum so that systems could expand to meet future market demand.[3/] The comments described efforts underway to identify the optimal frequency bands below 500 MHz for NVNG MSS use. These efforts have included the retention of the engineering consulting firm of Cohen, Dippell & Everist, theoretical analyses and meetings with representatives of the private land mobile community.[4/] In addition, the parties have been actively engaged in obtaining empirical data, including field tests to measure the actual level of usage in particular frequency bands. Given the ongoing nature of these efforts at the April 14, 1995 deadline for submission of reply comments in this proceeding, the parties indicated that the comments would be supplemented as additional information and data became available.

Reflecting the significant amount of work that has been undertaken over the last month, this joint submission identifies the specific frequency bands that the undersigned parties are proposing as candidates for new NVNG MSS allocations. The proposed bands are as follows:

1. **Service Downlink: 386-390 MHz**

   A total of four (4) MHz of spectrum in the 386-390 MHz band is proposed for service downlinks (space-to-Earth).

2. **Service Uplink: 420-422, 455-456 and 459-460 MHz.**

   A total of four (4) MHz of spectrum is proposed for service uplinks (Earth-to-space) with two (2) MHz in the 420-422 MHz band and an additional two (2) MHz in the 455-456 and 459-460 MHz bands.

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[3/] The recently completed Conference Preparatory Meeting concluded that an additional 7-10 MHz should be allocated to the NVNG MSS in the near future.

[4/] On May 3, technical representatives of the U.S. Little LEO proponents met with representatives of the land mobile community for an exchange of technical information. Attached as Exhibit 1 is a list of attendees at the meeting and the agenda.

### 3. Feeder Links: 216-216.5 and 217.5-218 MHz (downlinks) and 450-451 MHz (uplinks).

Two (2) MHz of feeder link spectrum is proposed with one (1) MHz of spectrum in the 216-216.5 and 217.5-218 MHz bands for feeder downlinks and one (1) MHz in the 450-451 MHz band for feeder uplinks.

Each of these frequency bands, and the bases for its selection, are discussed below in greater detail. The relevant selection criteria have been fully detailed by the parties in their respective comments in this docket. The Final Report of the WRC-95 Industry Advisory Committee, including the IWG-2 report, also provides a detailed discussion of the sharing ability of NVNG MSS "permissive entry" systems and criteria for selecting candidate bands.[5/] These criteria include the need for frequencies below 500 MHz to facilitate the use of low-cost ground terminals, global availability and compatibility with existing users.[6/]

As a general matter, in selecting candidate bands, the parties considered both government and non-government spectrum. The spectrum proposal set forth herein attempts to achieve a balanced approach considering the existing uses of the bands between 100-500 MHz.[7/] The parties

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[5/] See Final Report of the FCC Industry Advisory Committee for the ITU 1995 World Radiocommunication Conference, submitted May 4, 1995. (IAC Final Report).

[6/] The comments and reply comments point out that: (1) frequencies in the VHF/UHF band are particularly well-suited to low-cost terminal production; (2) the use of higher frequencies approaching 1 GHz, puts upward pressure on terminal prices, thereby diminishing the utility of the low-cost messaging band; (3) it is desirable to have a minimum of 5-7% separation between uplink and downlink bands to allow for sufficient filtering of the signals; and (4) the requirements for uplink and downlink spectrum are different, because of the greater difficulty of sharing downlink bands.

[7/] A review of frequency bands between 100-500 MHz reveals three principal users: government, broadcasting and mobile services. Between 100-500 MHz, 184.1 MHz of the 400 MHz is allocated for exclusive government use, and 80 MHz is allocated for broadcasting (not including broadcast auxiliary.) See Exhibit 2 hereto which provides a break-down of frequency spectrum allocations in the 100-500 MHz band. Due to the continuous high-power transmissions of broadcast stations, the broadcast spectrum was considered undesirable from a sharing standpoint.

have proposed to share 6 MHz with government users (4 MHz in military bands and 2 MHz of government land mobile spectrum) and 4 MHz with non-government users.

In each case, the selection is based on the demonstrated ability of NVNG MSS systems to share with the existing terrestrial or satellite users of the bands. An effort was made to identify bands with compatible allocations. Bands were selected with existing allocations for satellite services, such as the 386-390 MHz band, or with terrestrial users characterized by intermittent operations. Where non-government spectrum has been proposed, the selection of frequencies has been guided by a desire to minimize the impact on existing users in those bands and to minimize interference to NVNG MSS systems. The specified non-government bands have been chosen on the basis of their relatively low levels of usage as well as compatibility between the NVNG MSS and existing users.[8/]

## II. INTER-SERVICE SHARING CONSIDERATIONS

The ability of non-geostationary MSS systems to share with terrestrial fixed and mobile users operating in the same frequency bands has been documented in theoretical studies. For example, the conclusion that MSS below 1 GHz systems can effectively share with mobile users is supported by recommendation ITU-R M.1039 (Method for Evaluating Sharing Between Stations in the Mobile Service Below 1 GHz and FDMA Non-Geostationary Satellite Orbit (Non-GSO) Mobile Earth Stations) and Recommendation ITU-R M.1087 (Method for Evaluating Sharing Between Systems in the Land-Mobile Service and Spread-Spectrum LEO Systems in the MSS

[8/] The use of the TRANSIT band (399.9-400.05), which will be available after January 1, 1997 for NVNG MSS use, has not been addressed herein. See US Footnote 326. GE has specified use of the band for service and feeder downlinks. Other parties are interested in using the band for feeder uplinks. The preference is for an allocation that accommodates all of these uses.

Below 1 GHz). These international recommendations use well defined analytical methods involving statistical approaches to indicate how narrow and wide band MSS systems can share spectrum with mobile users.

Typically, NVNG MSS systems below 1 GHz transmit small amounts of data. Market studies have shown that the majority of potential users for this service, such as the transportation tracking and utility monitoring markets, need only 20 to 100 bytes of data transmitted a few times per day at most. If the duration of the transmissions are brief, they also minimize the use of the spectrum. This combination of channel avoidance, brief message lengths, and low output power density will facilitate sharing of spectrum with many existing users in bands below 500 MHz.[9/]

The field of view of a non-geostationary orbit (Non-GSO) satellite can be quite large ranging from the 48 contiguous states to all of North America, depending on the altitude and minimum elevation angle selected by the various proponents. Thus, any given field of view would "see" many independent mobile transmitters at any given time. A channel would be considered vacant only if unoccupied by a mobile transmission throughout the entire field of view. In practice, this will be accomplished by setting criteria by which a given channel would be presumed to be unoccupied by a mobile user.

Underlying the NVNG MSS service rules, adopted by the Commission in 1993, is the assumption that inter-service sharing can be successfully achieved between NVNG MSS systems and other services through various techniques including geographical separation and power

[9/] For a more detailed technical discussion, see IAC Final Report at 99-100.

limits as outlined in Table 1 below. While the specific sharing considerations will differ in particular bands, the basic assumption that NVNG MSS can share with existing users is equally applicable to other frequency bands.

**Table 1. NVNG MSS Service Rules**

| | |
|---|---|
| Feeder Uplinks | • Coordination required with other services. |
| Service Uplinks | • Active avoidance of frequencies being used by other services for narrowband NG MSS systems.<br>• Power density limit for spread spectrum systems. |
| Feeder Downlinks | • Flux density limit at the Earth's surface. |
| Service Downlinks | • Flux density limit at the Earth's surface. |

In general, FDMA narrow band NVNG MSS systems use band scanning receivers and predictive algorithms to identify service uplink band channels that will be clear and unused during the next uplink frame time. These channels are then assigned to NVNG MSS transceivers to use for uplink bursts. If the predictive algorithm is perfect, then the NVNG MSS transceiver transmissions will never cause interference into other service receivers. Even where the prediction is not perfect, however, the probability of interference is still small. For interference to occur, the NVNG MSS transceiver would have to be located close to the other service receiver and operating on the same frequency. Even if interference did occur, NVNG MSS transceivers typically transmit with infrequent short bursts thereby reducing the statistical probability of interference.[10/] A larger bandwidth reduces the interference potential by allowing for more choices and increasing the likelihood of finding a clear channel.

[10/] As an example assume that the other service is land mobile radio and that the predictive algorithm was poor and incorrectly assigned an active channel once every 5 seconds. Further assume that the satellite footprint has a radius of 2,000 km and that the separation distance required between a NVNG MSS transceiver and a land mobile radio operating on the same frequency to prevent interference is 30 km. Assuming a 2 MHz bandwidth and 25 kHz land

Footnote continued on next page

With regard to the downlink, it would be extremely difficult for FDMA systems to use a predictive algorithm. This is because there is no practical way for the satellite to survey and assign unused downlink channels. Consequently, FDMA downlinks must operate in a low enough noise environment that will enable the transmission to reach the receiver. This can be accomplished by either band segmentation with other services or a practical power flux density limitation.

Sharing with terrestrial systems by wideband CDMA systems is accomplished by using spread spectrum techniques to spread NVNG MSS data over very wide bandwidths such that the data have the appearance of being in the noise floor of narrow band terrestrial systems.

In developing this spectrum proposal, NVNG MSS proponents sought to identify bands where interference to NVNG MSS systems would also be minimal. As a general matter, uplink interference into NVNG MSS satellite receivers results from the aggregate transmit power generated by other services in the satellite footprint on the channel being used by the NVNG MSS uplink. Downlink interference into NVNG MSS terminal receivers results from other service transceivers within the radio horizon of the NVNG MSS terminal. Bands that are suitable for sharing with the NVNG MSS are those with the characteristics shown in Table 2.

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Footnote continued from previous page

mobile radio channels, then there are 80 possible channels and a given land mobile radio will experience actual interference once every 20 days assuming it is turned on continuously. Assuming 4 hours per day usage results in an expected interval between interference events of 4 months.

**Table 2. Characteristics of Bands Suitable for Sharing with NVNG MSS**

| | |
|---|---|
| Feeder Uplinks | Clear channels or allocated to services with low power transmitters. |
| Service Uplinks | Allocated to services with low power transmitters, or channelized with a high probability of some number of unused channels at any given instant of time. |
| Feeder Downlinks | Clear channels or allocated to services with limited geographical distribution of fixed transmitters to facilitate site coordination. |
| Service Downlinks | Clear channels or allocated to services with low duty cycles. |

The bands proposed herein meet the selection criteria discussed above. In addition, design of the NVNG MSS systems, FDMA and CDMA, will include appropriate sharing considerations.

## III. SPECIFIC ALLOCATION PROPOSALS

### A. Service Downlink: 386-390 MHz

#### 1. Frequency Selection

The parties propose an allocation of four (4) MHz of spectrum in the 380-400 MHz band, with a preference for 386-390 MHz, on a co-primary basis for non-geostationary mobile satellite service in the space-to-Earth direction. Minimum 1 MHz increments are required to support the proposed NVNG MSS systems. Although the preferred frequencies are specified, the parties would be willing to utilize whatever 4 MHz (in 1 MHz increments) within the 380-400 MHz band or elsewhere may be identified by NTIA as optimal for sharing. It is hoped that the government will provide information on government use of certain frequency bands, or otherwise confirm the feasibility of sharing in the specified bands, so that the optimal 4 MHz can be

identified.[11/] Due to the requirements of the Little LEO downlink (which preclude use of narrow spot beams and require all ground receivers to be tuned to a specific frequency), it is preferable that the selected frequencies are not extensively used for terrestrial transmissions.[12/]

### 2. Reason for Selection

This band has been selected as a primary downlink band for several reasons. Most importantly, the 387-390 MHz portion of the band is currently allocated on a secondary basis to the NVNG MSS and is currently being used by the Russian GONETS system. Canada and Mexico are considering use of these bands for NVNG MSS systems, and other systems have been advanced published in those bands. At the 1992 World Administrative Radio Conference, a new footnote 641A was added to the International Radio Regulations providing that the 387-390 MHz band (space-to-Earth) in the mobile-satellite may also be used by non-geostationary satellite systems subject to the application and coordination procedures set forth in Resolution 46.[13/] New footnote 641 has not been adopted in the United States. Use of the 335.4-399.9 MHz bands in the United States is now limited to military operations: fixed, mobile and mobile-satellite. [14/]

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[11/] The U.S. Little LEO proponents have made several requests for access to the government database by appropriate persons in order to review spectrum usage and signal and operational characteristics so that suitable spectrum can be identified. To date, NTIA has not responded to a written request to review government use of certain frequency bands by the Chair of IWG-2 on October 27, 1994 or to other oral requests for information by the parties.

[12/] Frequency agility, as used in narrow band uplink systems to avoid local terrestrial interference, is not useful here because the satellite has to broadcast to all ground terminals. Satellite antenna characteristics preclude the use of narrow spot beams for downlink services. Therefore, the space-to-Earth transmissions are broadcast over the entire satellite view of field which is generally 3000 to 4000 kilometers. As a result of these operational characteristics, terrestrial transmission in the band may interfere with the Little LEO ground terminal.

[13/] See Final Acts of the World Administrative Radio Conference (WARC-92) at 16.

[14/] See 47 C.F.R. § 2.106, footnotes G27, G100. By footnote (G100), MSS is allocated on a primary basis for military operations.

The fact that a downlink allocation already exists leads to the conclusion that NVNG MSS downlinks can co-exist with terrestrial users. In addition, the Commission has identified the 380-400 MHz band as a potential candidate for reallocation and has noted the growing interest in civilian use of the band in Europe.[15/] Many European nations are considering using the 380-400 MHz band for commercial operations. This corroborates the conclusion that sharing between government systems and the NVNG MSS is possible.[16/] Given indications that this band will be opened for greater commercial use, it would be desirable for these users to be U.S. companies.

According to NTIA, the 225-400 MHz band is primarily used by tactical radios.[17/] Specifically, there are 25,000 air-ground-air radios using the Have Quick frequency hopping architecture.[18/] If the Have Quick radios have small hop sets and long dwell times, then clear channels can be assigned to the NVNG MSS. Alternatively, if the Have Quick radios have large hop sets and short dwell times, then the NVNG MSS may be able to accept this interference.[19/]

Accommodation of a number of communication systems can be accomplished by band segmentation and channel avoidance where specific portions of the band are cooperatively

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[15/] See Report From the Federal Communications Commission to Ronald H. Brown, Secretary, U.S. Department of Commerce Regarding the Preliminary Spectrum Reallocation Report, FCC 94-213, released August 9, 1994, at 24-25.

[16/] According to NTIA, this "band is standardized with U.S. military allies in Europe and elsewhere for interoperability during combined actions." See Preliminary Spectrum Reallocation Report, February 1994, NTIA Special Publication 94-27, at 4-23 (hereinafter "NTIA Preliminary Spectrum Report.").

[17/] Id. at 2-25.

[18/] See id. at 4-23.

[19/] To the extent that there are satellite radios in the band it should be noted that they have tuning step sizes as small as 5 kHz. See Jane's Military Communications, Fifteenth Edition, 1994-1995, edited by John Williamson. This would allow the avoidance of NVNG MSS service downlink channels during normal peace time operations. The overlap of tactical operations with SATCOM operations within 225-400 MHz implies that such coordination is technically possible. The assumption is supported by the use of the 312-315 MHz band in Regions 1 and 3 for MSS.

allocated to certain systems. This approach has been successfully used in the 137-138 MHz MSS allocation. Wide band and narrow band systems can utilize power flux density limits at ground level to enable sharing with other services. These limits would be established through an analysis of sharing between MSS and existing services.

### B. Service Uplink

#### 1. 455-456 and 459-460 MHz

The 455-456 MHz and 459-460 MHz bands are proposed for NVNG MSS service uplinks (Earth-to-space). The NVNG MSS can share with existing users of the bands.[20/] The NVNG MSS proponents have reviewed various mobile bands to determine which will be most amenable to sharing. A review of those bands allocated to mobile services reveals that the 455-456 MHz and the 459-460 MHz bands are capable of supporting uplink bands for the NVNG MSS.

The 455-456 MHz band is presently used by the broadcast auxiliary services for remote pickup. This is primarily intermittent service for the transmission of material from the scene of events back to studio, communications related to production of remote programs and technical support including cues, orders, dispatch instructions, frequency coordination and establishing microwave links and for telemetry and control.

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[20/] Based on a review of the Commission's Notice of Proposed Rule Making in PR Docket No. 92-235, FCC 92-469, released November 6, 1992, these bands appear to have been exempted from refarming.

The 459-460 MHz band is presently assigned to the Domestic Public Land Mobile Radio Service (DPLMRS). This is the original public push-to-talk mobile radio service. It is believed that the level of usage of these frequencies is declining due to migration to cellular telephones.

ITU Study Group 8/3 concluded that NVNG MSS uplinks can effectively share with terrestrial mobile services by using dynamic channel assignment or low power CDMA systems. A more detailed review of the existing users in these bands and the ability to share with NVNG MSS systems is provided in Appendix A to this filing, which consists of an Engineering Statement prepared by the technical consulting firm of Cohen, Dippell & Everist. Cohen, Dippell & Everist conclude that sharing of the band is practical given the respective characteristics of remote pickup auxiliary broadcast, the DPLMRS and the NVNG MSS. Sharing can be accomplished by using dynamic channel avoidance, brief message duration, low power flux density and geographical separation. This is consistent with the conclusions of Study Group 8/3 that NVNG MSS systems can share with fixed and mobile services.

### 2. 420-422 MHz[21/]

This band has been selected as an uplink band for several reasons. First, there needs to be at least 5-7% separation between the downlink and uplink bands. This band provides the minimum separation with the matching 386-390 MHz downlinks. Second, this band contains some intermittent mobile users with which NVNG MSS FDMA systems can share successfully.

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[21/] The parties have also identified the 416-418 MHz band as an alternative for uplink spectrum. The 410-420 MHz band is allocated for government non-military fixed and mobile use. The parties have based their proposals for use of government spectrum within the 410-420 MHz bands on publicly available information. However, they are willing to consider any frequencies within that range that may be deemed more suitable for sharing by NTIA.

Third, while this band contains radios for drones, it is believed that drone radios operate on an intermittent basis allowing for successful sharing. Finally, the 420-423 MHz band is currently being considered by Canada as an uplink band for the NVNG MSS.[22/]

The 420-450 MHz band is allocated nationally on a primary basis to government fixed and mobile radiolocation systems (see footnote G2), and remote operation of drones at various test ranges. Non-government users include the amateur service on a secondary basis and the land mobile service in limited locations, i.e., 50 mile radius of Detroit, Cleveland, and Buffalo.

Within the 420-430 MHz band, there were about 217 Government Master Frequency ("GMF") assignments as of September 1991 distributed among various agencies including the Air Force, Army, Coast Guard, Department of Energy, NASA, and Navy.[23/] Of these, 62 assignments are radiolocation with the remaining for various fixed and mobile services. The distribution of GMF assignments with geographical coordinates in this band is contained in Figure 1. The majority of the assignments (62) are for low power remote control (telecommand) of drones. Although there is insufficient information on the exact location of frequencies used by any of the systems in the band, it is believed that NVNG MSS systems can share with drones.

### C. Feeder Uplink: 450-451 MHz

The 450-451 MHz band is proposed for feeder uplinks. This band is currently allocated for broadcast auxiliary use and satellite communications.[24/] The NVNG MSS can share with

[22/] These frequencies are proposed on the basis of publicly available information about government systems. However, NVNG MSS proponents would consider other frequencies within the 410-423 MHz band if such frequencies are deemed more suitable by NTIA for sharing. The 410-420 MHz band is currently being considered by Mexico.

[23/] Assessment of Bands for Wind Profiler Accommodation, NTIA Report 91-280, September 1991 at 5-12.

[24/] The frequency 450 MHz may be used for space telecommand at specific locations. 449.75 - 450.25 MHz may be used for space operation service and space research service in the Earth-to-space direction.

these existing users as discussed in the Engineering Statement prepared by Cohen, Dippell & Everist (Appendix A.) Appendix A indicates that the existing usage of this band is very low based on the relatively small number of authorized transmitters in the band (about 54,678 nation-wide) and results from monitoring of the frequency.

One potential source of interference into the NVNG MSS feeder links operating in the 450-451 MHz band is the currently proposed wind profiler radar transmitters which are seeking to operate at the 448-450 MHz band. However, geographic separation and service avoidance can be utilized to minimize interference. The feeder uplink gateway ground station emissions can be controlled so that the noise floor of a wind profiler radar receiver is not degraded, allowing the wind profiler to operate in an acceptable manner. In addition, the feeder gateway ground stations can be located away from wind profiler radar service areas to minimize the impact to the wind profiler radar service. Each NVNG MSS system will utilize only a few feeder gateway ground stations. Thus, opportunistic site selection of the feeder gateway ground stations should be easily accomplished in areas that are beyond the line-of-sight of wind profiler radar locations and therefore usually eliminate the need for other interference reduction methods. A detailed discussion of specific means to minimize interference between wind profiler radars and NVNG MSS systems is provided in Appendix B.

### D. Feeder Downlink: 216-216.5 MHz and 217.5-218 MHz

The parties propose allocation of 216-216.5 MHz and 217.5-218 MHz for NVNG MSS feeder downlinks. Based on the relatively low number of transmitters in these bands, and the type

of existing users, sharing between the NVNG MSS systems and the existing users is believed to be feasible.

### 1. Existing Users

The 216-218 and 219-220 MHz bands are allocated to the Maritime Mobile service on a primary basis. Based on the review of authorized facilities, existing operations are limited primarily to the Mississippi River and connecting waterways, Gulf Intercoastal Waterways and the offshore waters of the Gulf of Mexico. The FCC has issued approximately 75 licenses for the Automated Maritime Telecommunications Service (AMTS). The AMTS is an intermittent push-to-talk radio system used primarily for barge traffic up and down the Mississippi River. In the lower adjacent band 210-216 MHz, television channel 13 operates nationwide.

Government usage of the band 216-220 MHz is sparse. According to NTIA, there are no government Maritime Mobile operations in the band and very little aeronautical mobile use.[25/] The predominant Government users in the bands are the Departments of Energy and Interior with assigned services for telemetry systems in the fixed and mobile service for seismology. NTIA indicates that many of the systems are used intermittently as required by the experiment being conducted. The only major radar in this band is the Navy SPASUR which operates on the frequency 216.98 MHz (± 1 Hz). The Navy has four assignments for the SPASUR system, a bi-static radar system used to collect data on satellite trajectories. SPASUR transmitters are located in Alabama, Arizona and Texas and receivers in Arkansas, Mississippi, California, New Mexico and Georgia.

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[25/] Assessment of Bands For Wind Profiler Accommodation, NTIA Report 91-280, September 1991.

## 2. Sharing Ability

Due to the large coverage area of NVNG MSS feeder downlink transmissions, maritime mobile receivers operating on the same channel may be subject to interference from a satellite downlink. It is believed, however, that interference will be insignificant given the small number of licensed facilities and the under-utilized nature of these facilities due to migration to cellular telephones and other communication systems. Interference can be further minimized by appropriate PFD limits. While there is a possibility that a marine radio could experience interference, the likelihood is extremely small.

Maritime stations could cause interference into the NVNG MSS feeder link and downlink if the feeder links are not sited properly. However, feeder gateway ground stations can be located away from maritime service areas to minimize the impact of maritime service on the feeder downlinks. Each NVNG MSS system will utilize only a few feeder gateway ground stations. Thus, careful site selection of the feeder gateway ground stations should be easily accomplished in areas that are beyond the line-of-sight of maritime service transmitters and therefore eliminate the need for channel reassignments. The impact to the maritime service on NVNG MSS downlinks should be small to non-existent and coordinated operation appears practical.

The 216-218 MHz feeder downlink may cause out-of-band emissions to 216.88-217.08 MHz SPASUR radar receivers. However, it is believed that sharing between SPASUR and NVNG MSS feeder links can be successfully accomplished for reasons more fully detailed in Appendix B hereto.

Feeder link operation will be adjacent to television channel 13 (210-216 MHz). Interference from channel 13 TV transmitters to feeder downlink receivers should be negligible. Out-of-band emission from a properly operating TV station should not cause significant interference to gateway feeder link stations located at a proper site. The feeder gateway ground stations can be located a sufficient distance from a TV station in order to minimize interference.

Use of the 216-218 MHz feeder downlink emissions should not cause interference into television channel 13. Based on previous FCC analyses for Inland Waterways Communications Systems (IWCS), conservative estimates indicate that 216-216.5 MHz feeder downlink operation adjacent to channel 13 transmitters is easily possible.[26/] The FCC concluded in the IWCS proceeding that inter-service sharing between channel 13 and other services could be achieved through appropriate power limits. In the case of NVNG MSS feeder links, the power level will be less than that found acceptable in the case of maritime systems. In the 216-220 MHz band, there is a secondary allocation for Government and non-government tracking and telemetry from buoys, wildlife, and airborne sensors (US210). NTIA Report 91-280 also cites telemetry for seismology. Since buoy and wildlife tag readout is usually performed from aircraft within line-of-sight of the buoy or tag, the out-of-band emissions from a satellite should be negligible. Interference from out-of-band emissions from buoys and wildlife tags can be reduced to tolerable levels by appropriate ground station site selection. Such tracking and telemetry services are also an ideal application for the NVNG MSS.

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[26/] See Inland Waterways Communications Systems, 84 FCC 2d 875 (1981).

## IV. CONCLUSION

The undersigned parties urge the Commission to recommend that the United States seek worldwide allocations at WRC-95 of the following specific frequency bands for non-geostationary MSS below 1 GHz: (1) 4 MHz of spectrum at 386-390 MHz (space-to-Earth) for service downlinks; (2) 2 MHz of spectrum in the 455-456 and 459-460 MHz bands and an additional 2 MHz at 420-422 MHz (Earth-to-space) for service uplinks; (3) 1 MHz of spectrum in the 216-216.5 and 217.5 -218 MHz bands for feeder downlinks (space-to-Earth); and (4) 1 MHz of spectrum in the 450-451 MHz band for feeder uplinks (Earth-to-space).

Respectfully submitted,

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